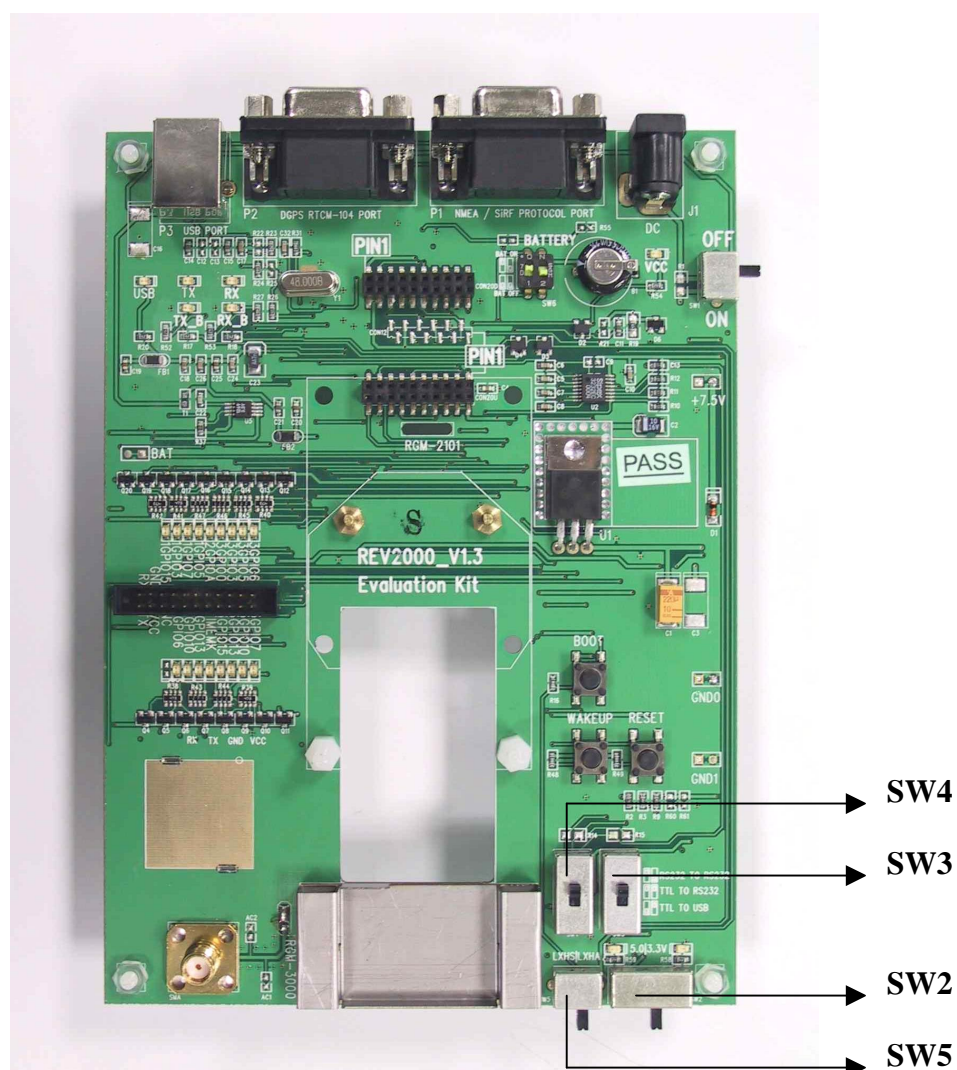


## **RoyalTek Evaluation Kit REV-2000 Operational Manual**

### QUICK START :

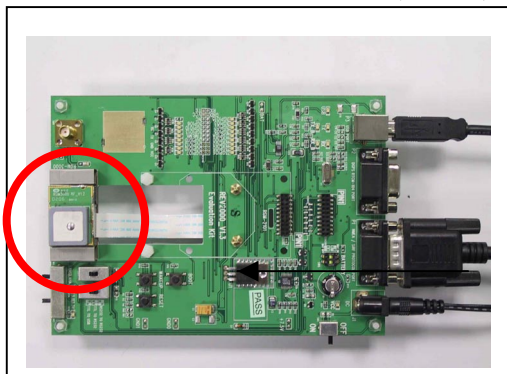
		RS-232(P1)		USB(P3)		
	SW2	SW4	SW3	SW4	SW3	SW5
REB-12R ( 3.3V 、TTL 、HA )	→	↑	↑	↓	↑	→
REB-12R ( 5.0V 、TTL 、HA )	←	↑	↑	↓	↑	→
REB-12R ( 3.3V 、TTL 、HS )	→	↑	↑	↓	↑	←
REB-12R ( 3.3V 、RS232 、HS )	→	↑	↓	↘	↘	←
REB-12R ( 5.0V 、TTL 、HS )	←	↑	↑	↓	↑	←
REB-12R ( 5.0V 、RS232 、HS )	←	↑	↓	↘	↘	←
REB-2101 、RGM-2101	→	↑	↑	↓	↑	↘
RGM-3000	→	↑	↑	↓	↑	↘



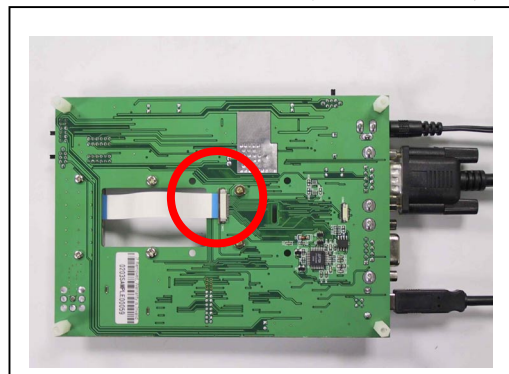
## Installation Photo

**RGM-3000M**

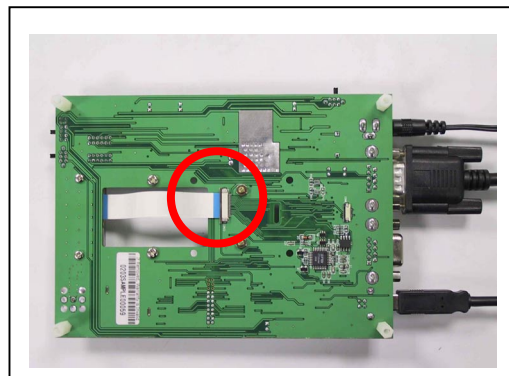
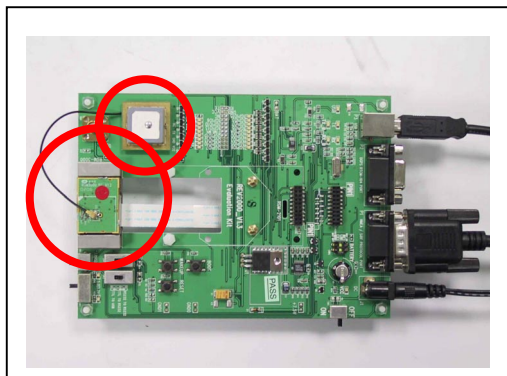
**( TOP )**



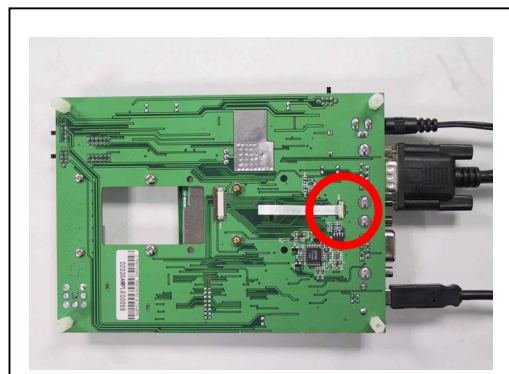
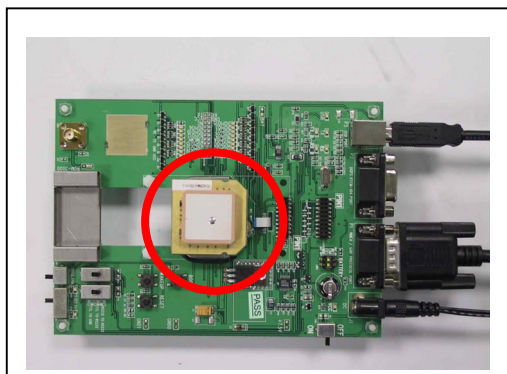
**( BOTTOM )**



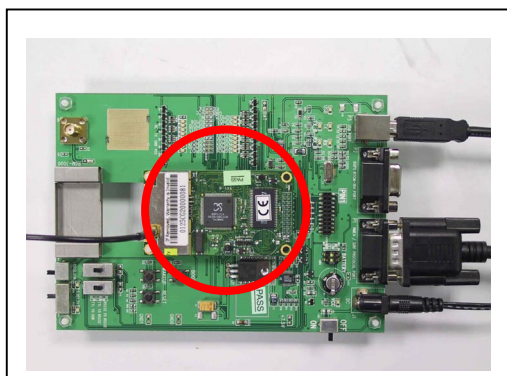
**RGM-3000E**



**RGM-2101M**



**REB-12R**



## Introduction

REV-2000 is an evaluation kit for Royaltek GPS series, RGM-2101/ RGM-3000/ REB-12R / REB-2101 . It is convenient to test the GPS performance 、 cold start / warm start / hot start 、 position update and so on by using the REV-2000. REV-2000 helps you understand the operation and

performance of Royaltek's GPS in a couple of minutes. It can also provide you to design the OEM products that use RoyalTek's GPS .

## Packing list

The evaluation kit contains as follows:



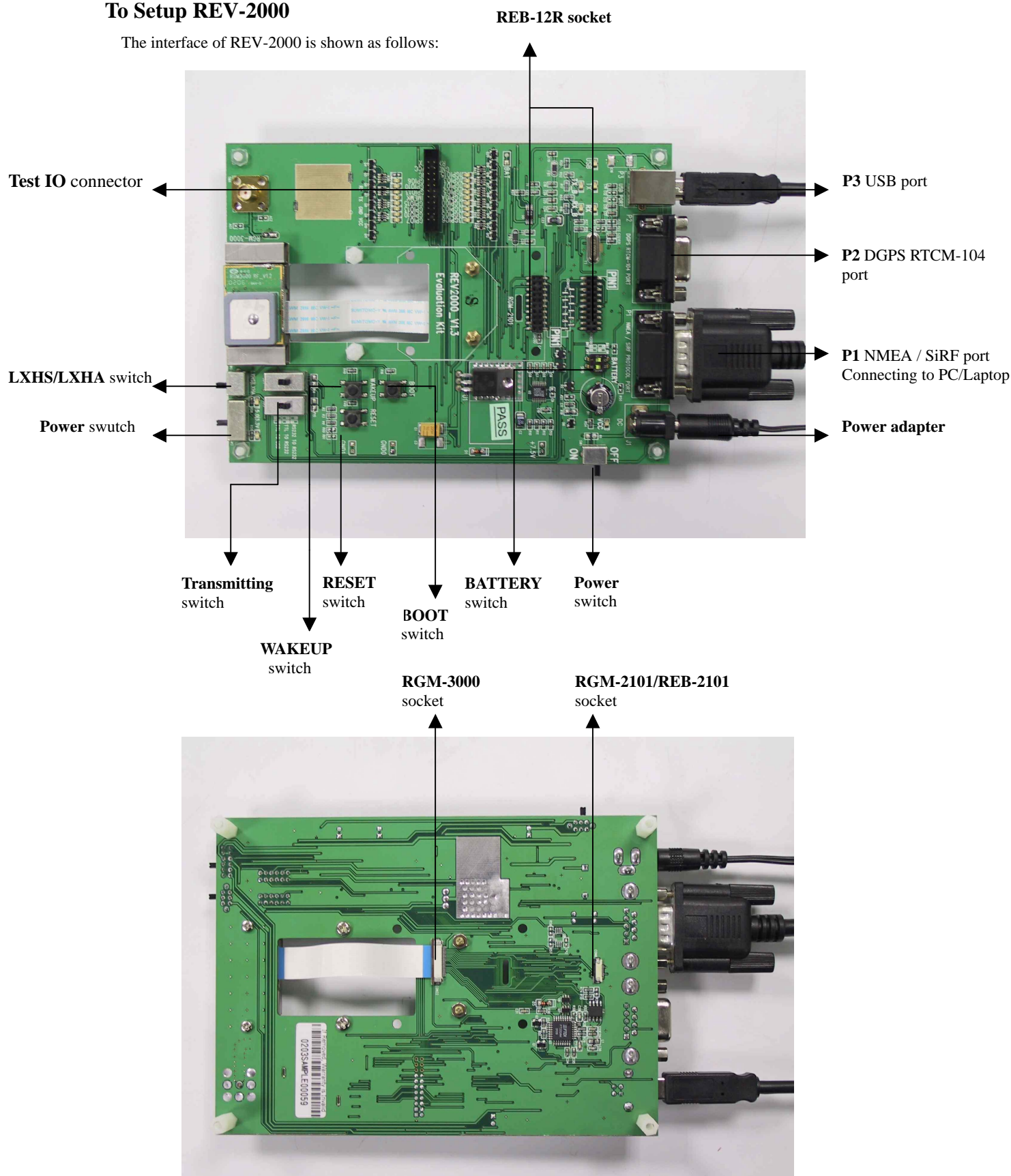
2. Power Adapter                      3. RS232 Cable                      4. USB Cable                      5. Test cable                      1. REV-2000 Evaluation board

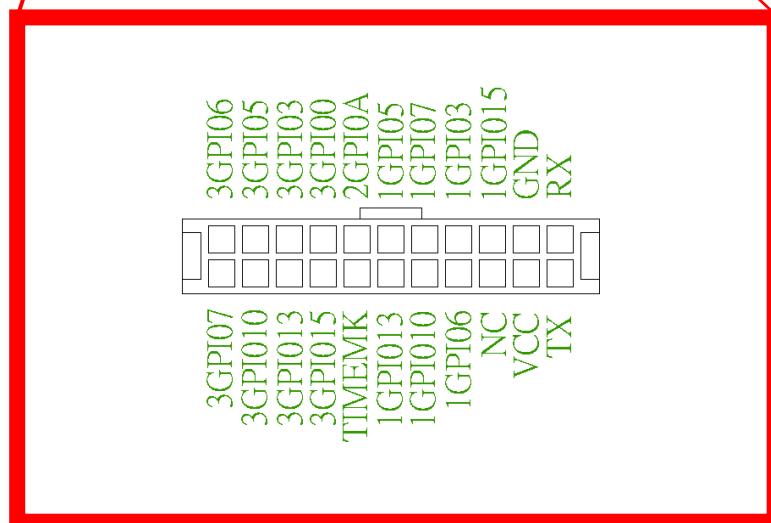
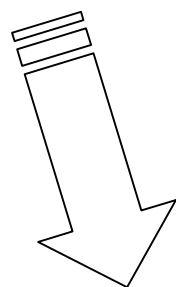
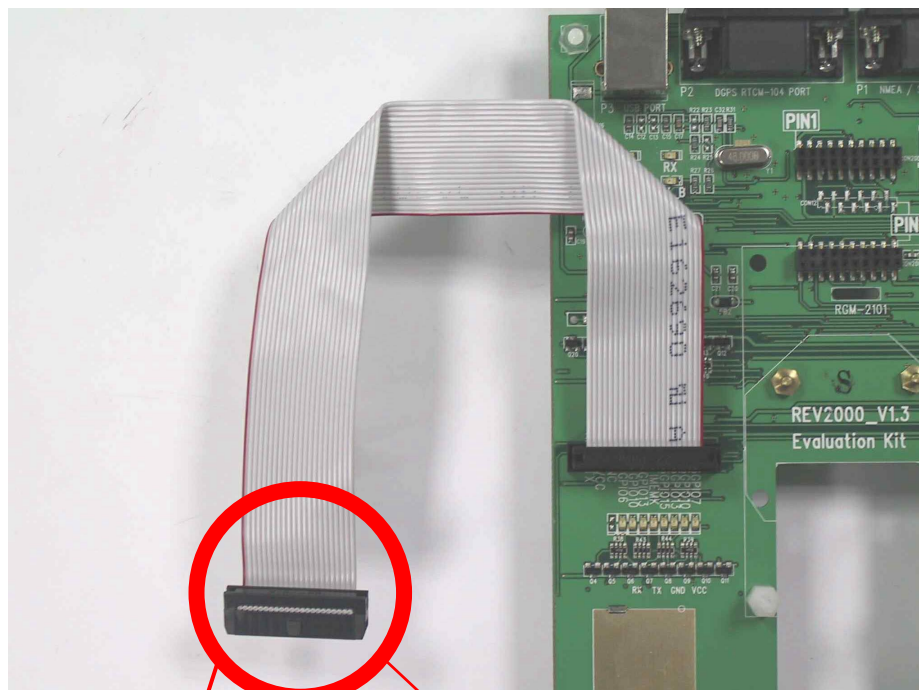
No.	Items	Specification	Quantity	Description
1	REV-2000 Evaluation Board	115*160mm	1	Provide power for GPS and convert the signal from TTL to RS-232 or USB connecting to PC.
2	Power adapter	AC 110V or AC 220V 7.5V/1.0A/2.5mm/1.8M	1	AC/DC adaptor
3	RS232 Cable	9pin/1.5M	1	RS-232 cable connecting evaluation board with PC.
4	USB Cable	A to B type/1.5M	1	USB cable connecting evaluation board with PC.
5	Test Cable	FLAT cable 22P 200mm	1	FLAT cable connecting evaluation board with User's Machine.

## Getting started

### To Setup REV-2000

The interface of REV-2000 is shown as follows:





**Power switch ( SW1 )**

The Power switch is for power ON or OFF .

**Power mode switch ( SW2 )**

The power adapter of REV-2000 is 110V AC/ 7.5V DC adaptor. It converts the 110 AC to DC.

RoyalTek can also provide you 220V AC power adapter. Beware of the AC power of your office and tell RoyalTek's sales person for preparing the correct power code for you.

REV-2000 provides 2 power modes on board, 3.3V and 5V. SW2: Left for +5V, Right for 3.3V. The 3.3V is for RGM-2101/ RGM-3000 / REB-2101.

The 5V is for REB-12R.

**Transmitting switch ( SW4 、 SW3 )**

RS232 TO RS232 : convert the signal from RS232 to RS-232 connecting to PC use P1.

TTL TO RS232 : convert the signal from TTL to RS-232 connecting to PC use P1. TTL TO USB : convert the signal from TTL to USB connecting to PC use P3.

**LXHS/LXHA switch ( SW5 )**

It can choose the LXHS or LXHA of REB-12R.

**BATTERY switch ( SW6 )**

Enable: The battery will supply the power to engine board or module.

Disable: The battery disconnected with engine board or module.

**BOOT switch**

The BOOT switch is for program upgrade. When push the BOOT switch, the GPS engine board is waiting for program upgrade and output nothing when running SiRF demo program.

Please refer the **program upgrade** session for program update.

**DC input**

The power input can be DC input instead of using AC power adapter. The input range of the

DC input is from 6.5V ~ 12V. We suggest you use +7.5V as the DC input.

**Reset switch**

It is used for external reset.

**Wakeup switch**

It is used for external wakeup.

**P1**

This is NMEA/SiRF protocol output/input port. Please connect it to PC or Laptop RS-232 port.

**P2**

This is DGPS input port.

**P3**

This is NMEA/SiRF protocol output/input port. Please connect it to PC or Laptop USB port.

**CON20D/CON20U**

This is the socket for REB-12R. Please refer the hardware interface section for the pin assignment.

**CON8**

This is the socket for RGM-2101 or REB-2101. Please refer the hardware interface section for the pin assignment.

**CON22**

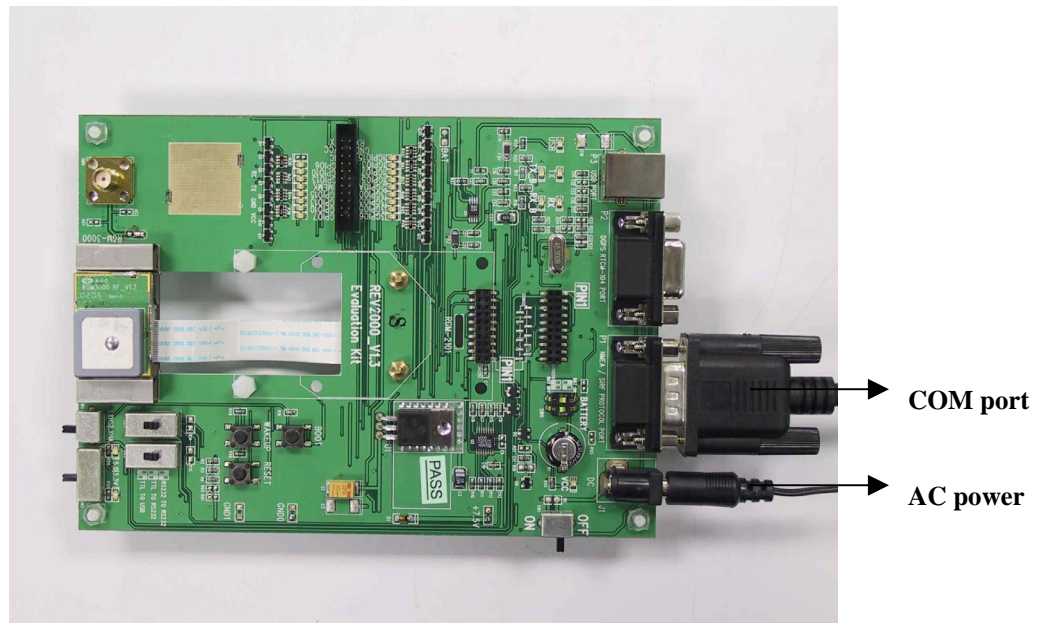
This is the socket for RGM-3000. Please refer the hardware interface section for the pin assignment.

**RS-232 setup procedure**

- (1) Plug the REB-12R on the CON20D / CON20U or Plug the RGM-2101 / REB-2101 on the CON8 or Plug the RGM-3000 on the CON22
- (2) Plug the active antenna into the external antenna connector. The suitable view angle of the active antenna is necessary. **Caution:**  
***Please do not put any metal stuff on the antenna.***

- (3) Connecting the RS-232 cable between  
REV-2000 P1 and PC.
- (4) Plug the power adapter. (or connecting the  
DC power input, 6.5V ~ 12V)

After you finish setup, it is like as follows:



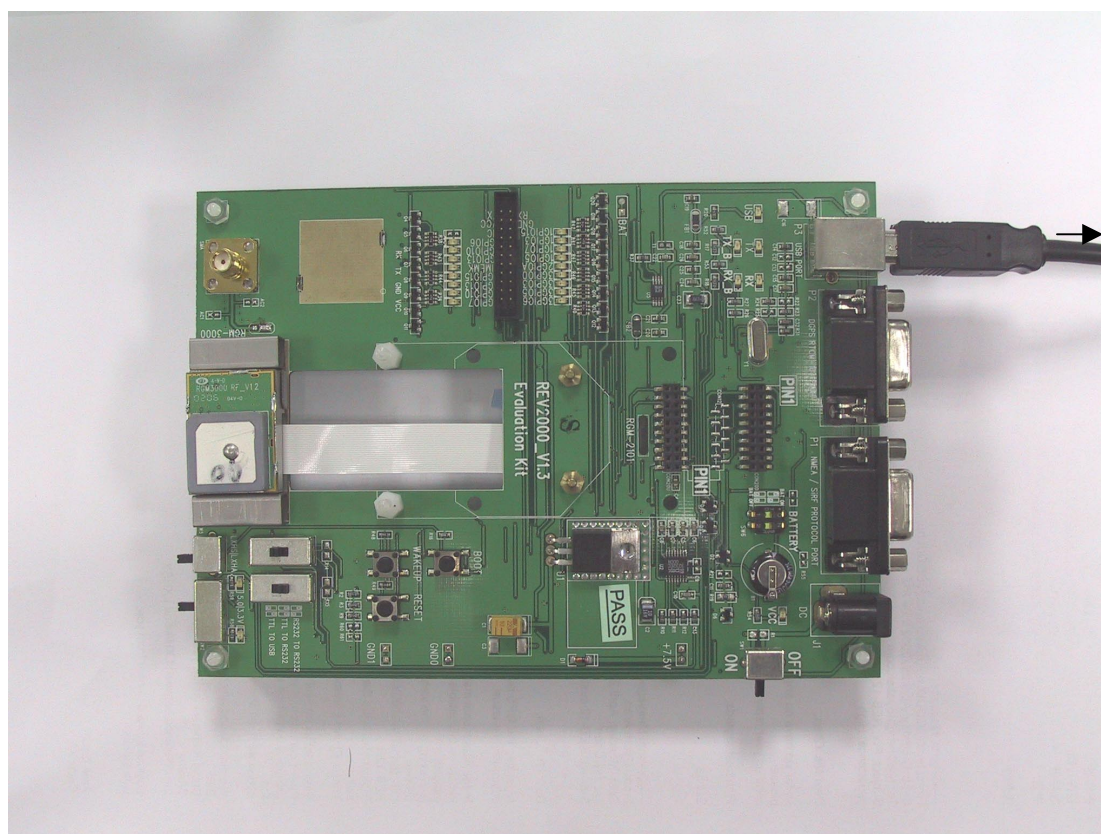
## USB setup procedure

- (5) Plug the REB-12R on the CON20D /  
CON20U or Plug the RGM-2101 / REB-2101  
on the CON8 or Plug the RGM-3000 on the  
CON22

- (7) Connecting the USB cable between  
REV-2000 P3 and PC.

After you finishing setup, it is as like as follows:

- (6) Plug the active antenna into the external  
antenna connector. The suitable view angle of  
the active antenna is necessary. **Caution:**  
**Please do not put any metal stuff on the  
antenna.**





USB port

# How to Install USB Driver for Windows 98®?

## Getting Started

Step 1: Plug USB connector to USB port of your Notebook PC .

Step 2: After plug in the REV-2000, it will automatically detect the hardware and show up pop-up dialog as follows. Click “Next>” button.



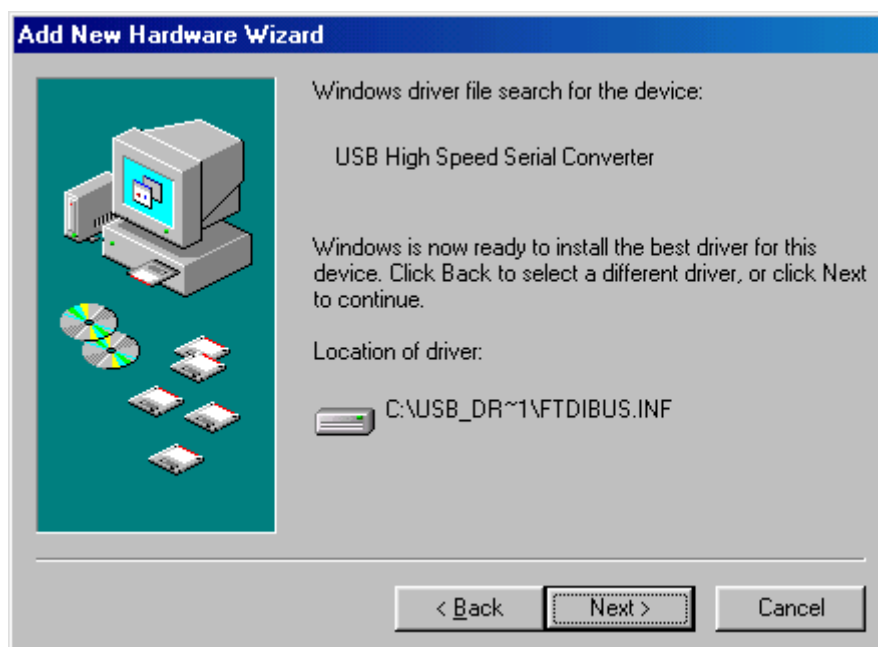
Assert the “Search for the best driver for your device”. Click “Next>” button.



Please assert the “Specify a location” and select the correct directory of the driver, “\USB\_DRIVER” in CD-Disc. Click the “Next>” button.



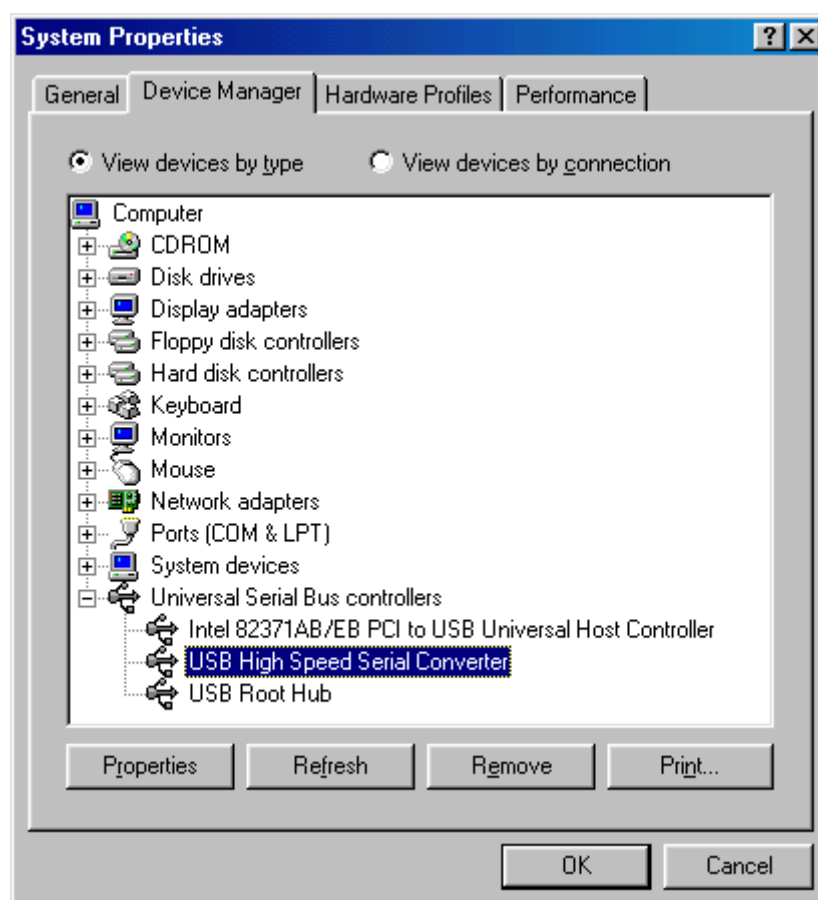
It will find the driver from the CD-Disc automatically. Click “Next>” button.



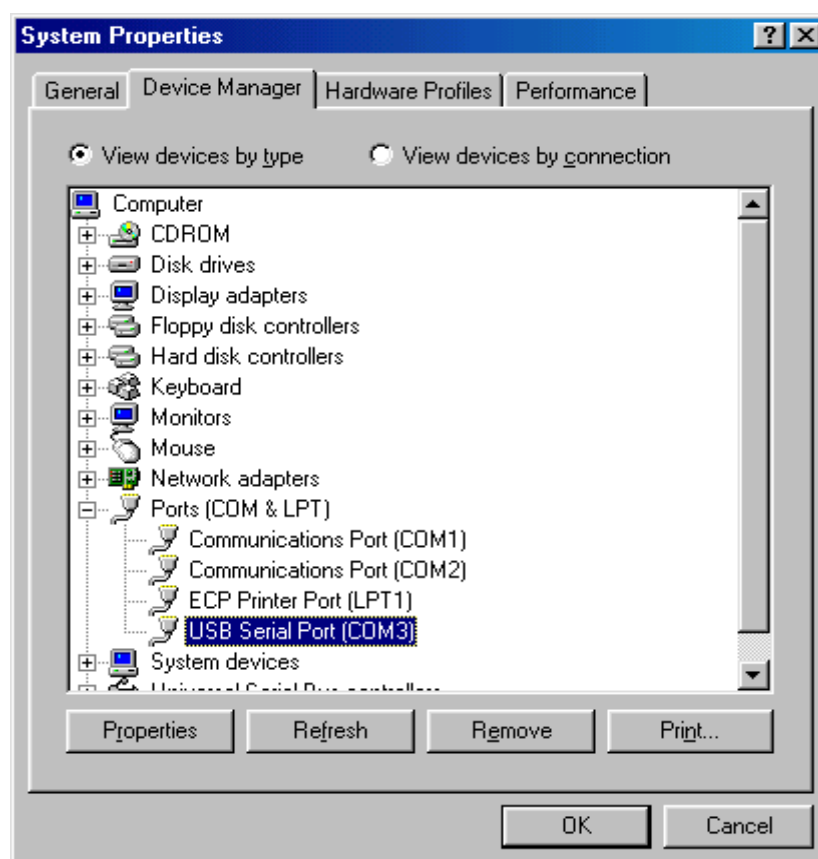
The USB Serial converter driver is installed now.



You can check the COM port number of USB port from the System properties now.



The default COM port is COM3 in this example.



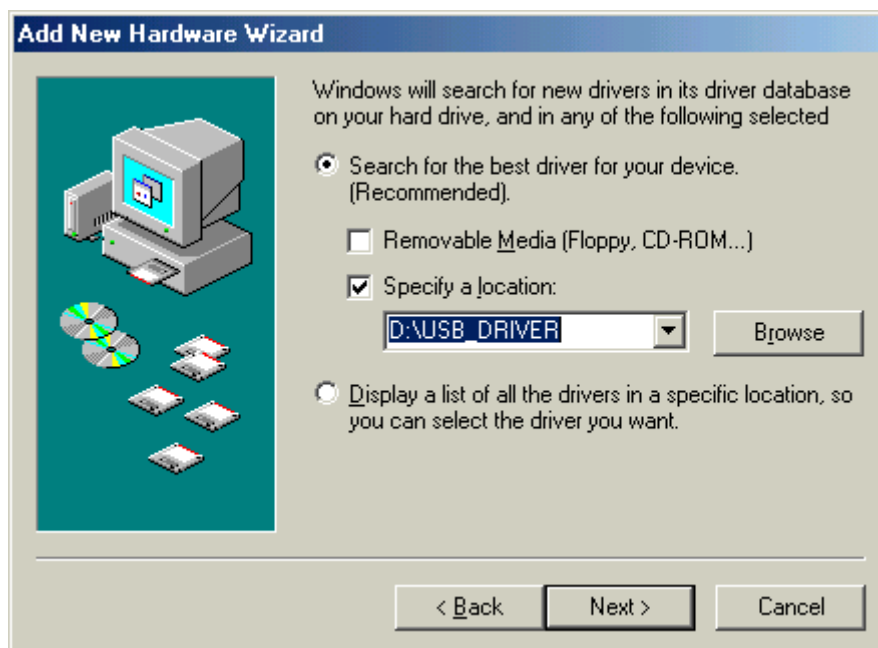
# How to Install USB driver for Windows Me®?

Step 1: Plug USB connector (①) to USB port on your Notebook PC .

Step 2: After plug in the REV-2000, it will detect the hardware automatically. Click the “Next>” button.



Please assert the “Specify a location” and select the correct directory of the driver in CD-Disc, “\USB\_DRIVER”. Click the “Next>” button.



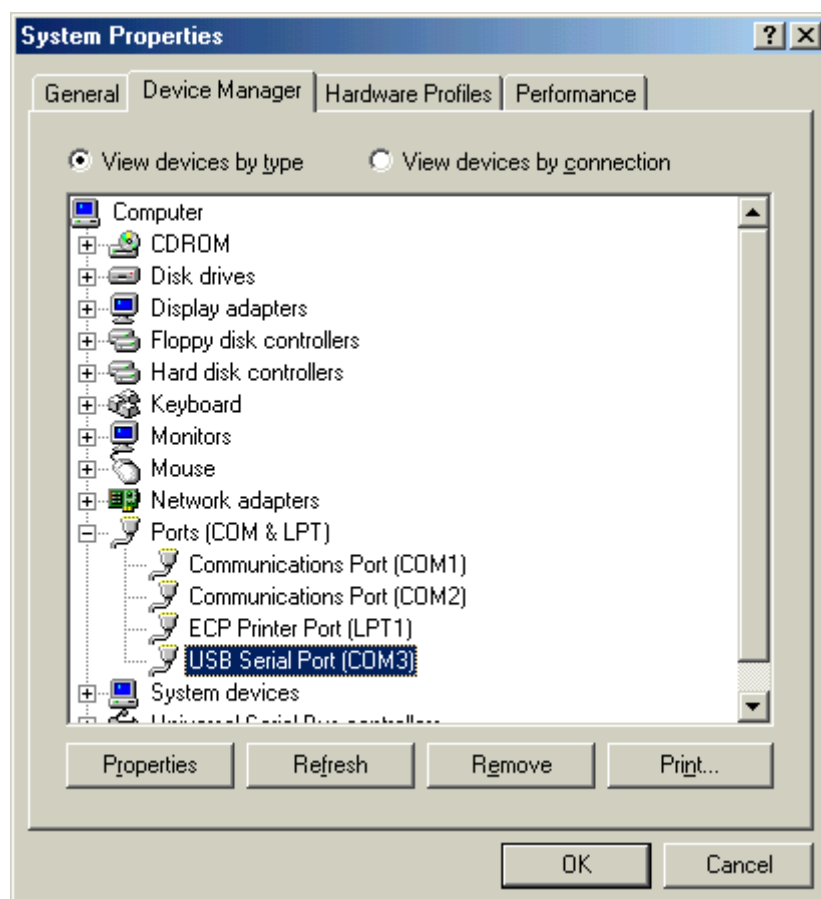
Windows Me will search and find the USB serial driver. Click “Next>” button.



The USB Serial converter driver is installed now.



You can check the COM port number from the System properties now.



# How to Install USB driver for Windows 2000®?

Step 1: Plug USB connector (①) to USB port to your Notebook PC .

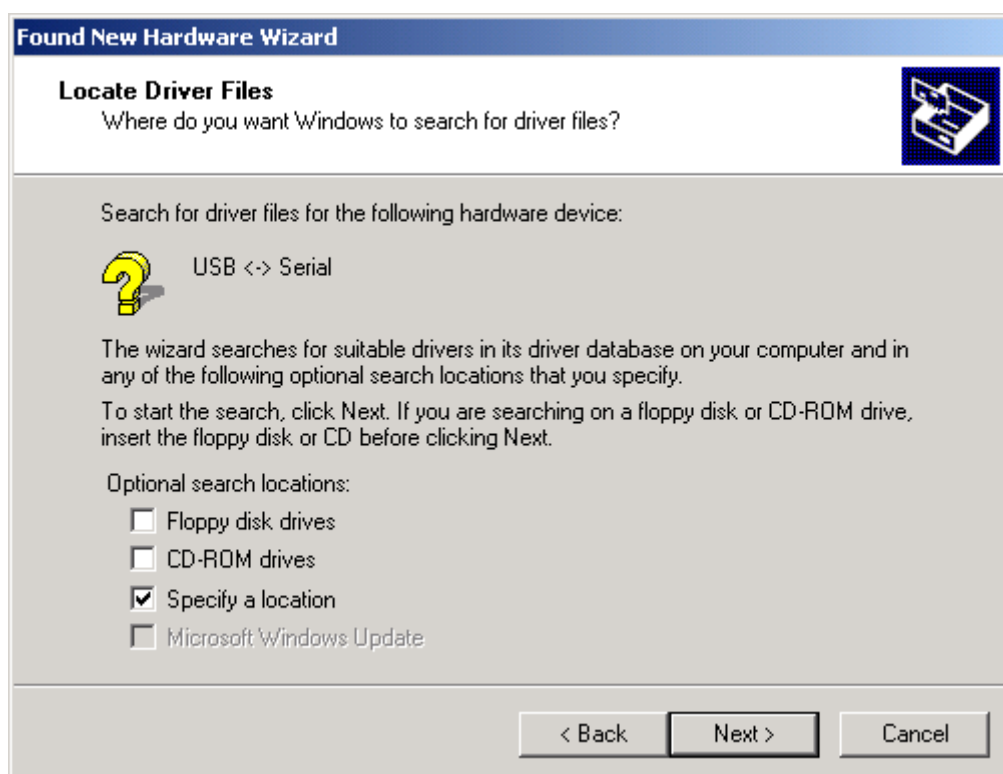
Step 2: After plug in the REV-2000 , it will detect the hardware automatically. Click the “Next>” button.



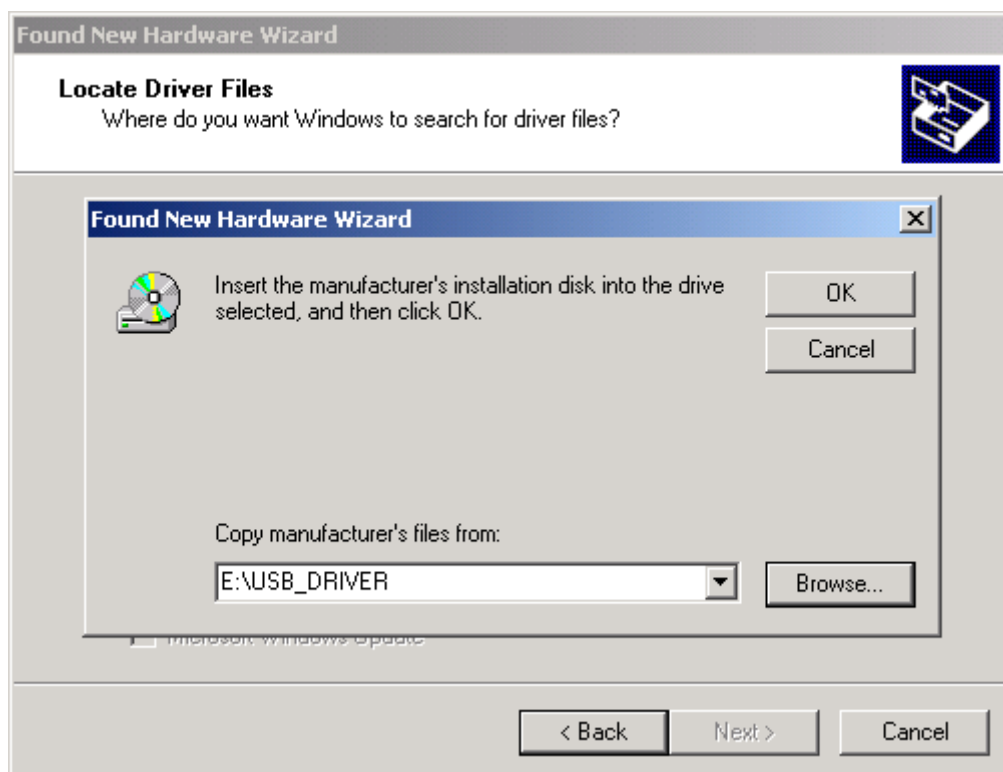
Please select “Search for a suitable driver for my device”. Click “Next>”



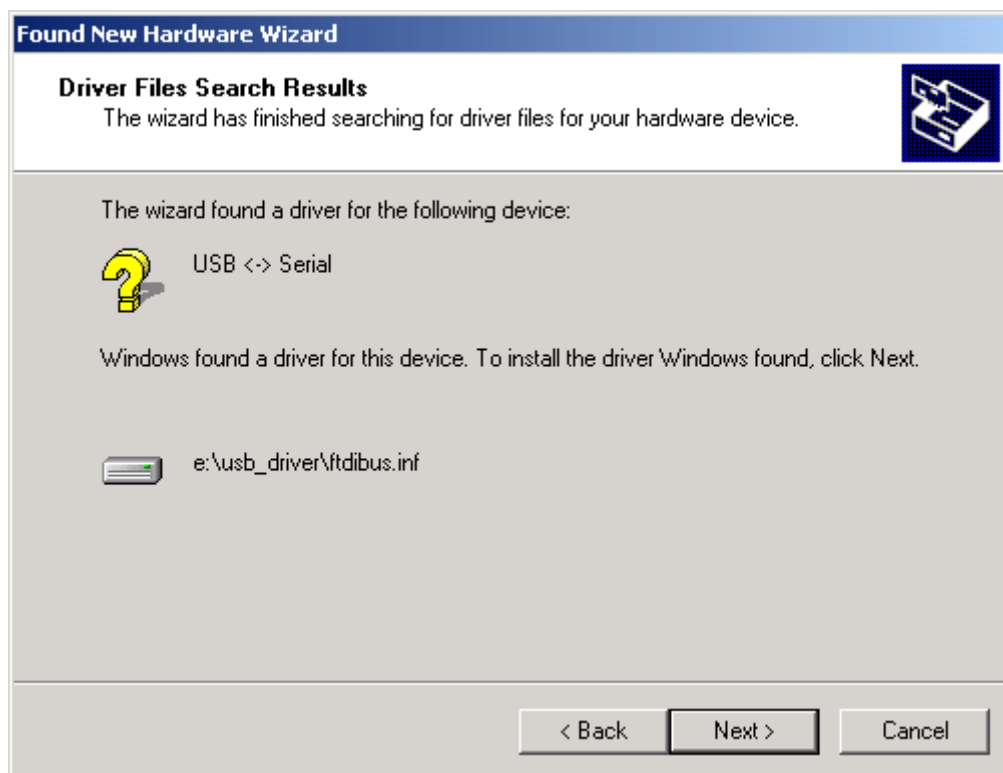
Please select the “Specify a location”. Click “Next>” button.



Please browse the CD-Disc and select the directory, “\USB\_DRIVER”. Click “OK” button.



Windows 2000 will find the USB Serial converter device. Click the “Next>” button.



The USB Serial driver is installed in Windows 2000® now.



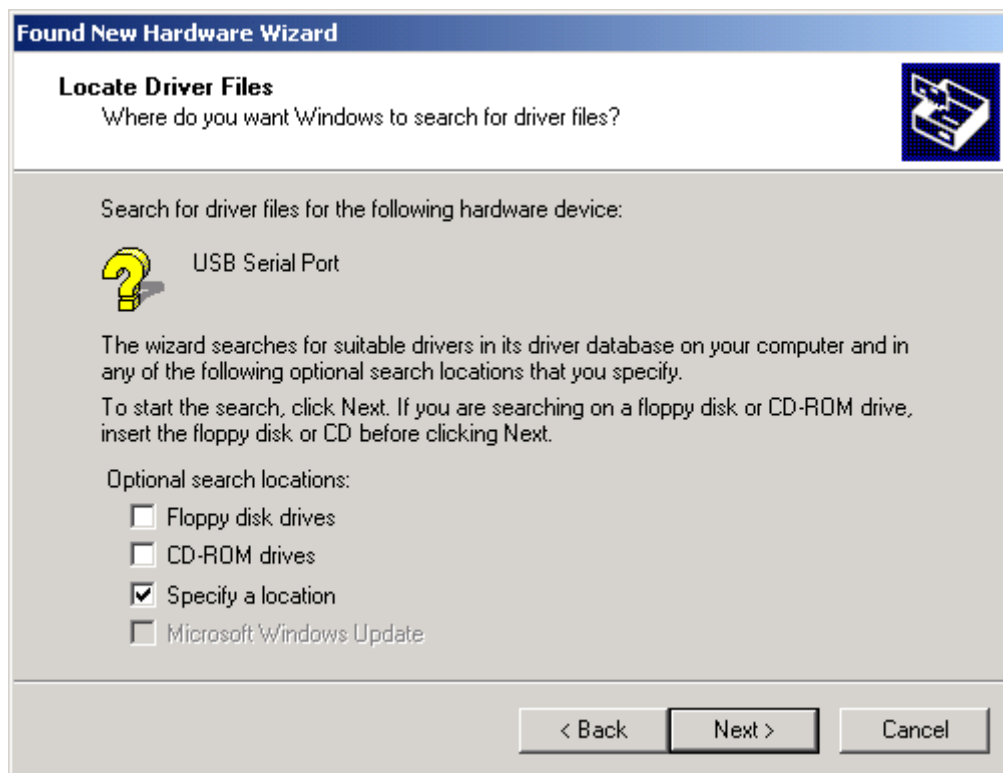
It will setup the USB Serial port driver for Sapphire. Please click “Next>” button.



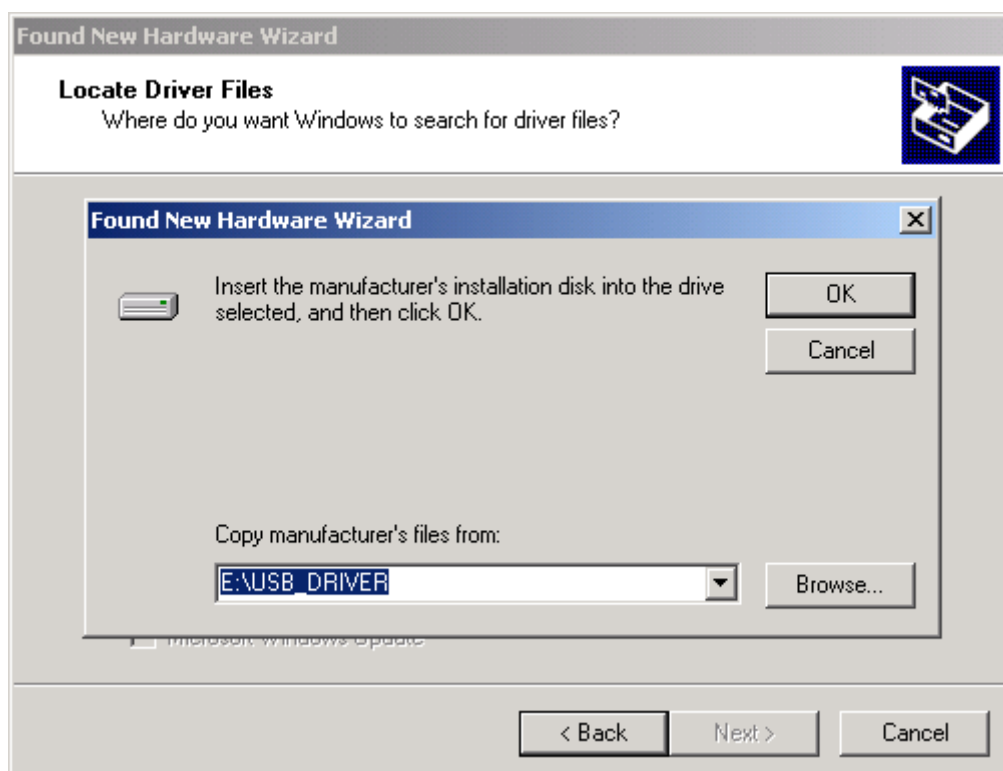
Please select the “Search for a suitable driver for my device”. Click “Next>” button.



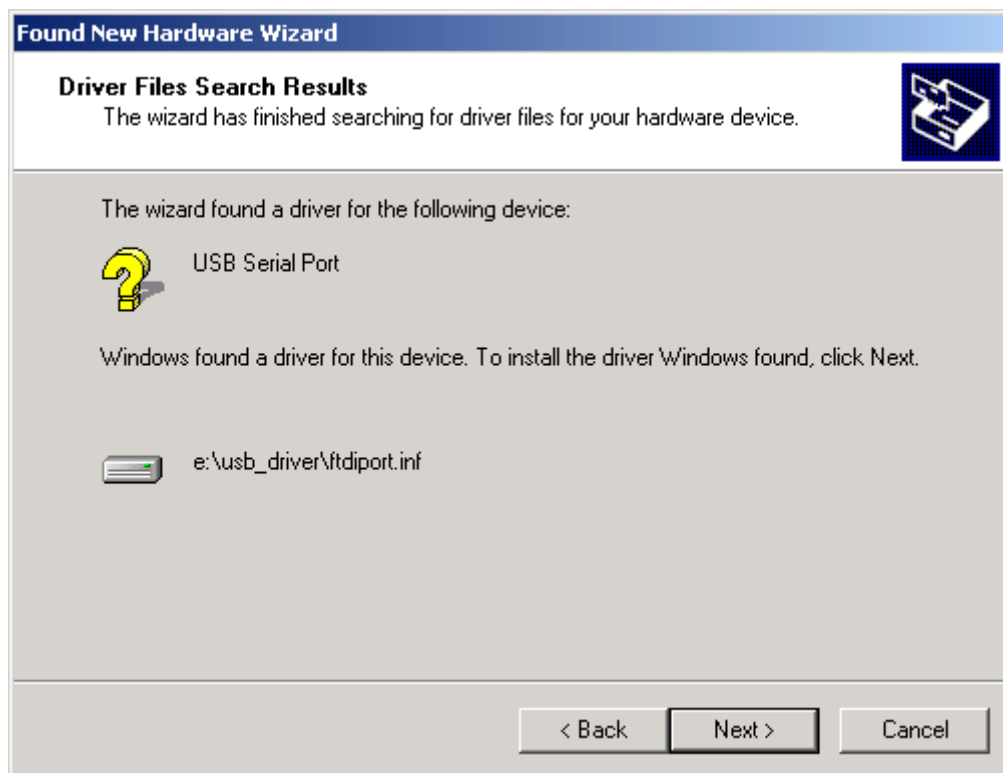
Please select the “Specify a location”. Click “Next>” button.



Please select the directory of the Sapphire, "\USB\_DRIVER". Click "OK".



It will find the driver and install it.

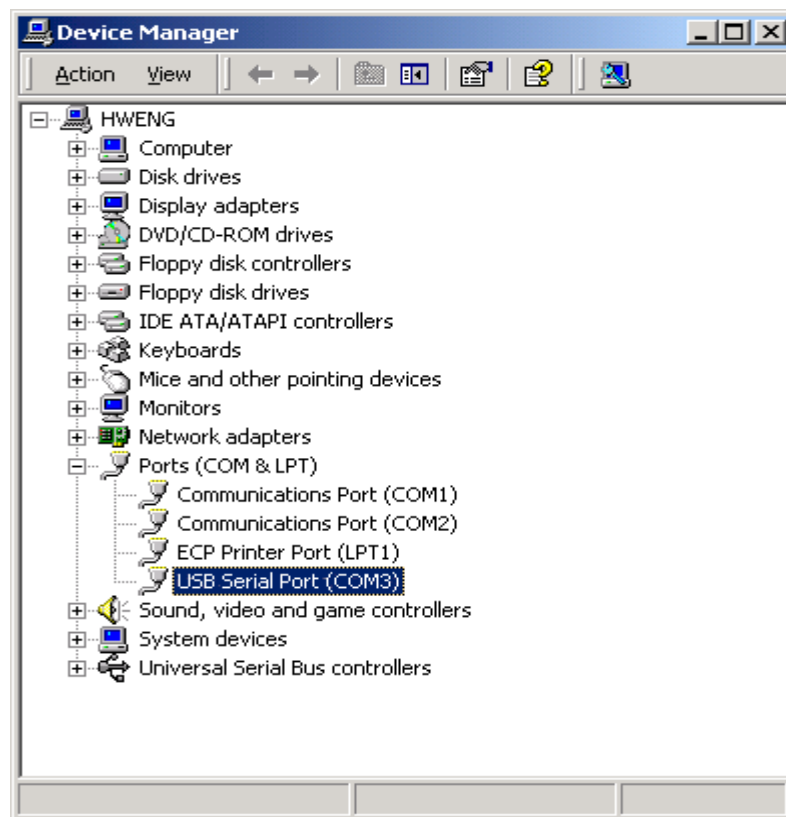


The USB Serial Port driver is installed in Windows 2000® now.



You can check the Com port number from Device Manager. It is COM3 in

this example.



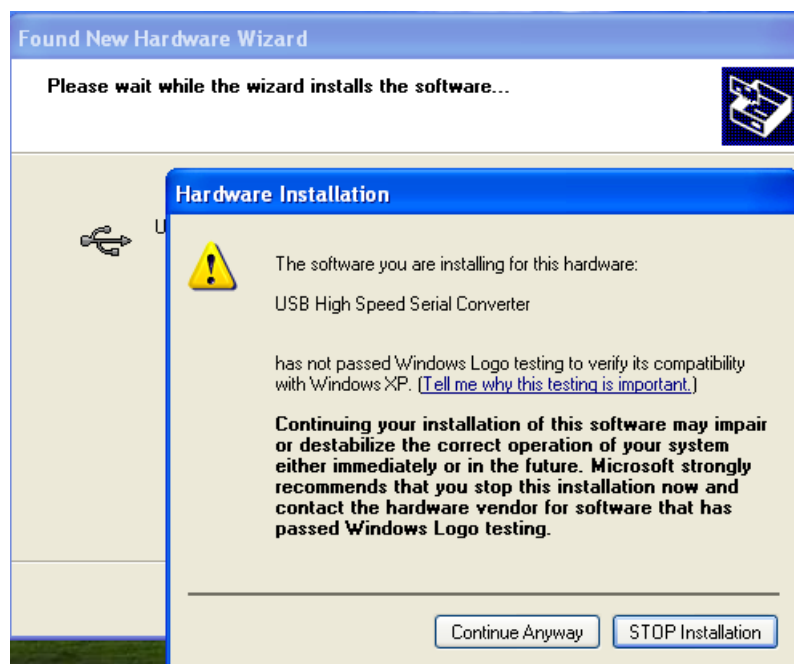
# How to Install USB driver for Windows XP®?

Step 1: Plug USB connector (①) to USB port to your Notebook PC and insert CD supported by Royaltek.

Step 2: After plug in the REV-2000, it will detect the hardware automatically. Please select the “Install the software automatically [Recommended]”. Click the “Next>” button.



Please select “Continue Anyway” and Click this button.



Please select the “Finish”. Click “Next>” button.



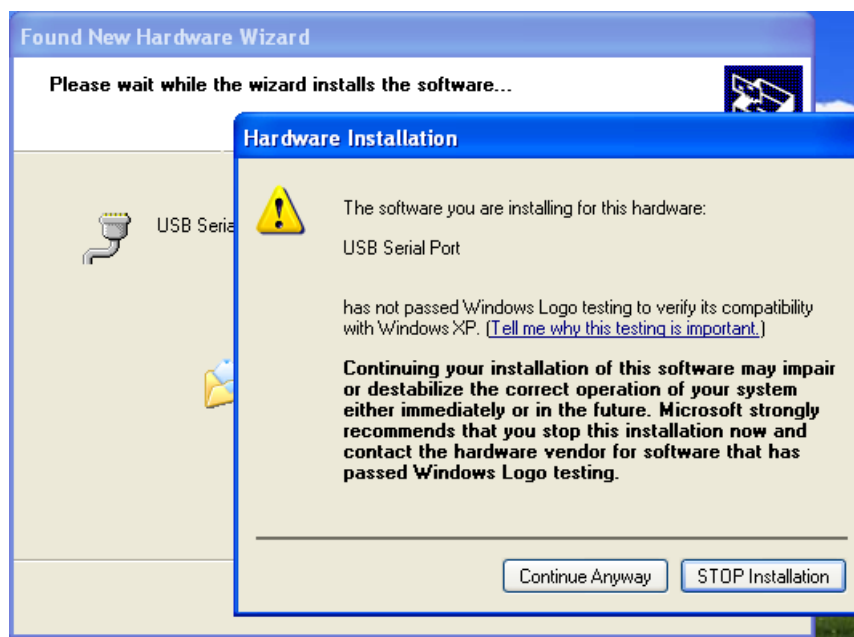
The USB Serial driver is installed in Windows XP® now. Please wait for about one minute.

It will setup the USB Serial port driver. Please select the “Install the software automatically [Recommended]”.

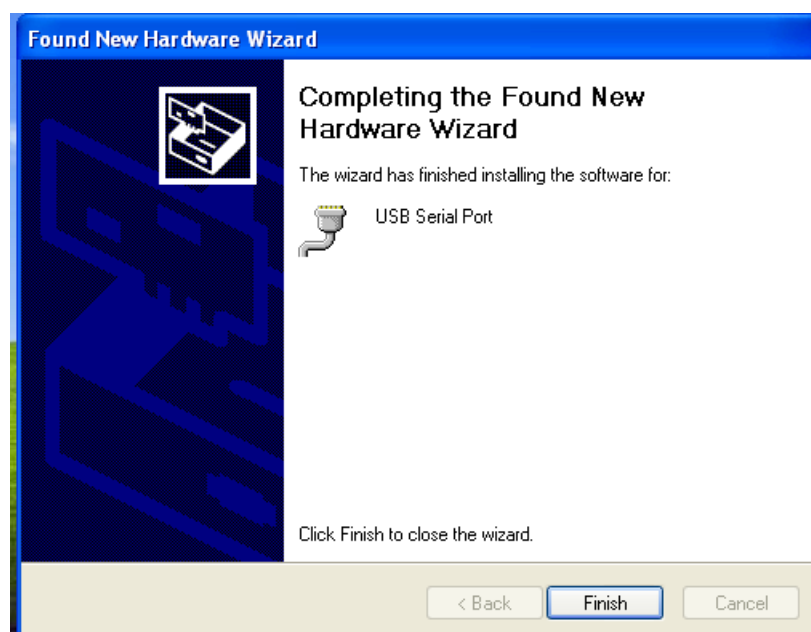
Click “Next>” button.



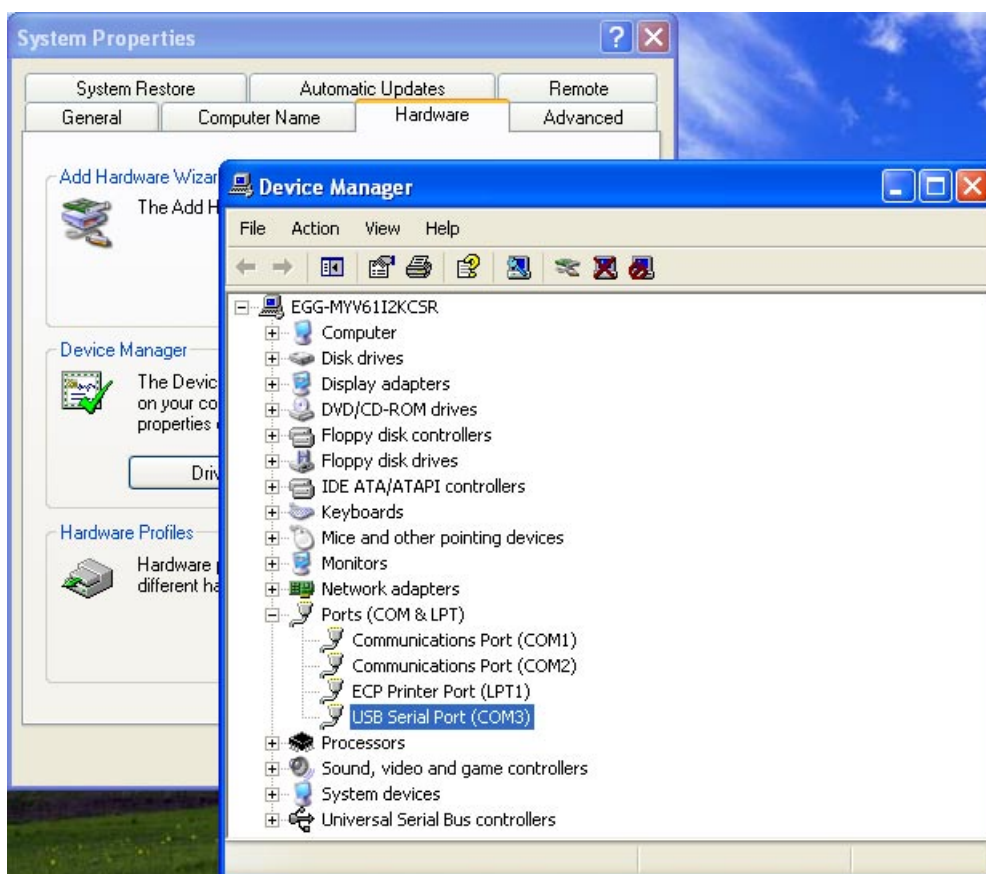
Please select “Continue Anyway” and Click this button.



The USB Serial Port driver is installed in Windows XP® now.



You can check the Com port number from Device Manager. It is COM3 in this example.



## To operate REV-2000

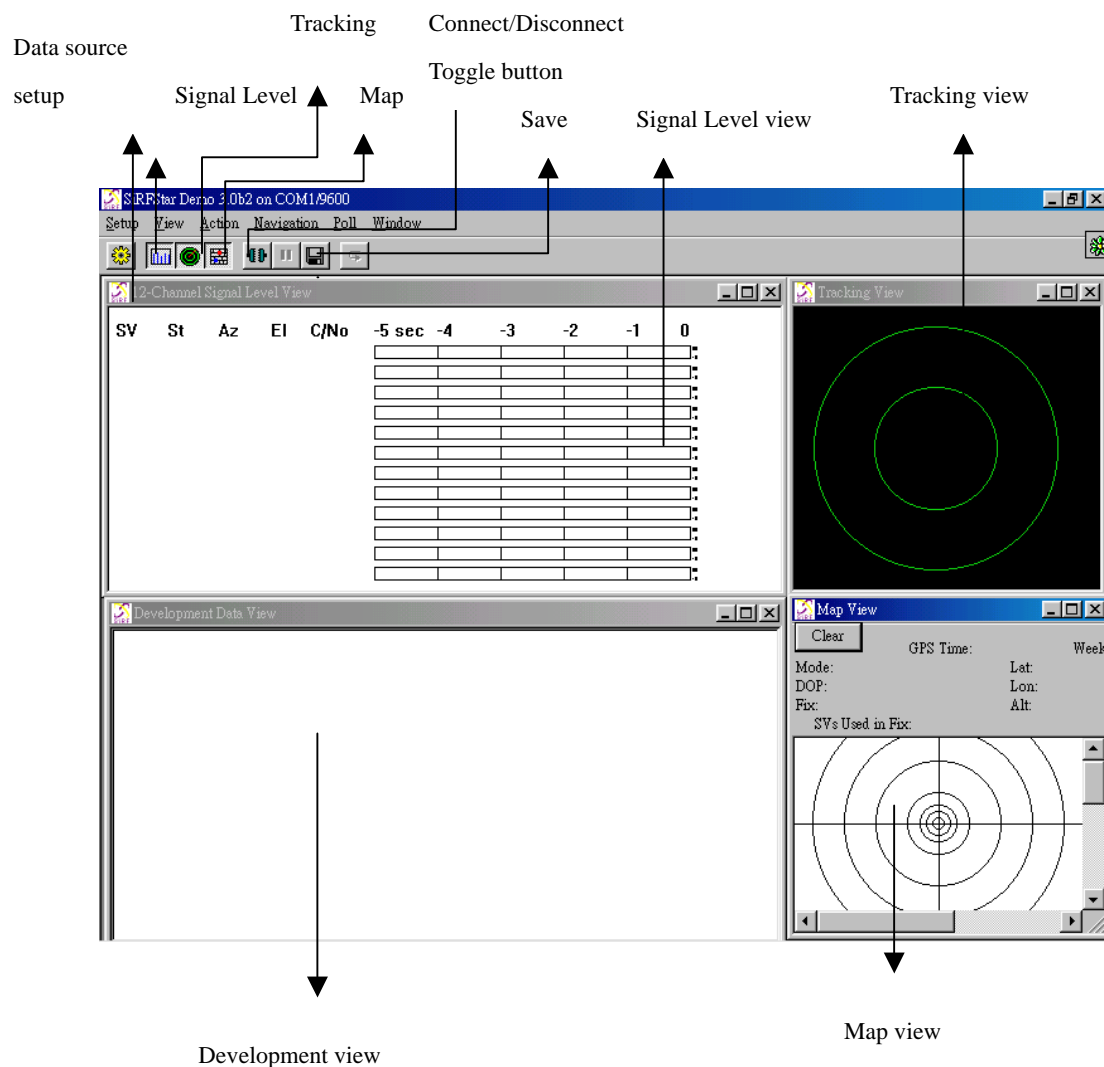
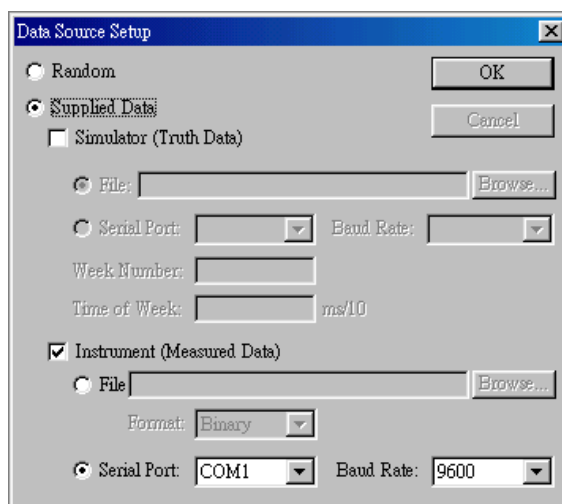
### Install the SiRFDemo.exe

Copy the SiRFDemo.exe from the CD-ROM  
 \Toolkit\SiRFDemo to the destination path, e.g.  
 “c:\RoyakTek\REV-2000\Demo”. Add a shortcut of  
 SiRFDemo.exe on the desktop of Windows 98.

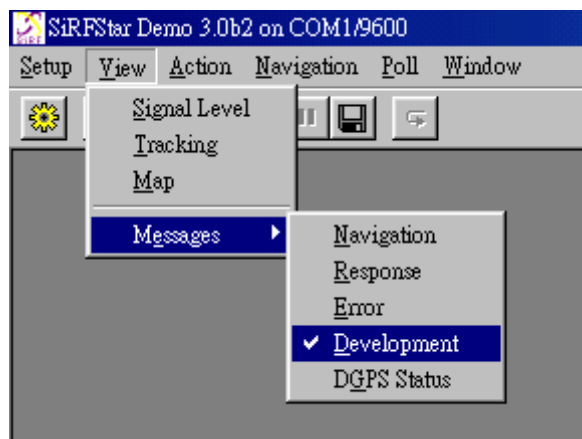
### To use Sirfdemo.exe




(1) Double click the SiRFDemo.exe.

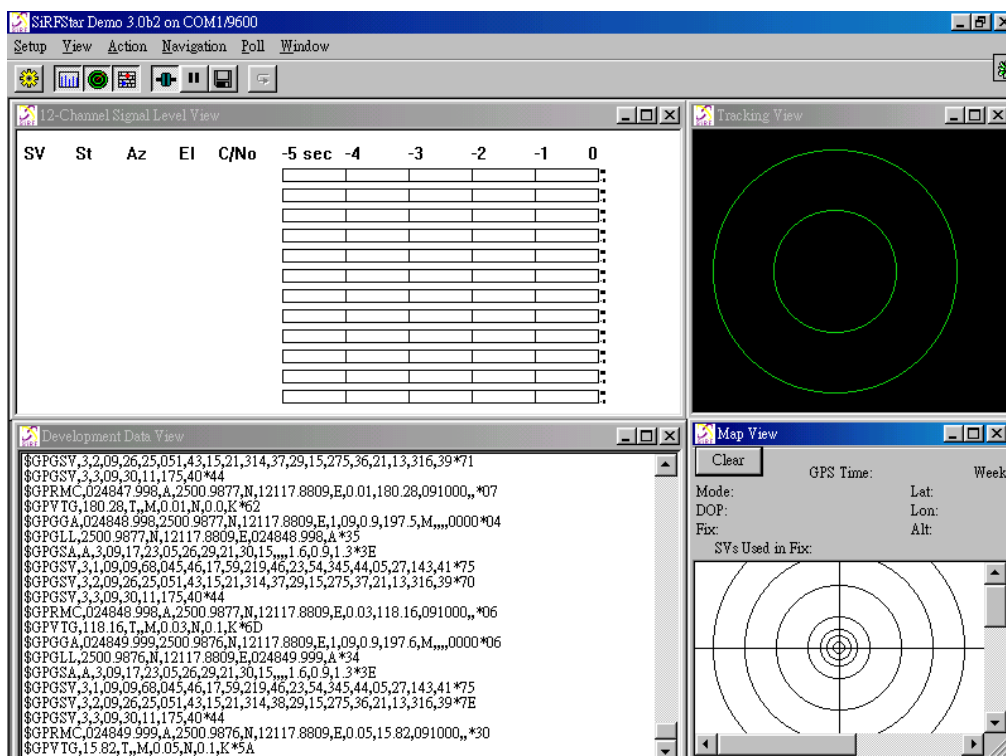
- (2) Choose the “Supplied Data” radio button.  
 Click the “Instrument(Measured Data)” check  
 box.
- (3) Select the serial port, e.g. COM1. The default  
 baud rate of Reb-12R is 9600bps. Click the  
 OK.
- (4) There are 6 menus on the menu bar: Setup,  
 View, Action, Navigation, Poll and Window.



- (5) Click the “Signal level”, “Tracking”, “Map” buttons of the tool bar to enable the “Signal level view”, “Tracking view” and “Map view”.
- (6) Check the View / Messages / Development to enable the development view.

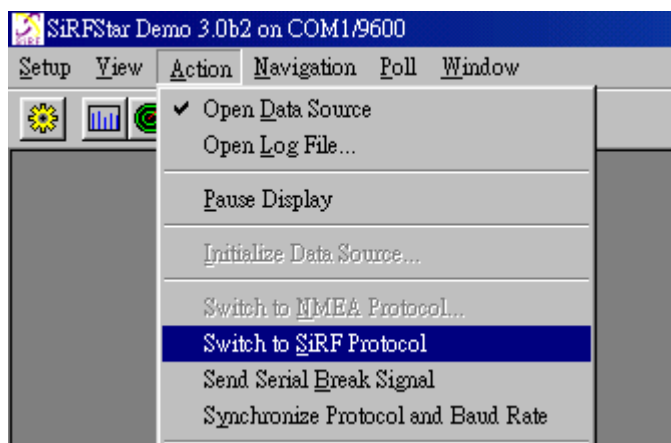


- (7) Click the  to start testing.
- (8) The other buttons of tool bar are explained as follows:
- (9) After you click the , you can see the NMEA output on the development view.
- (10) After you click the , Log the data as a \*.log file.

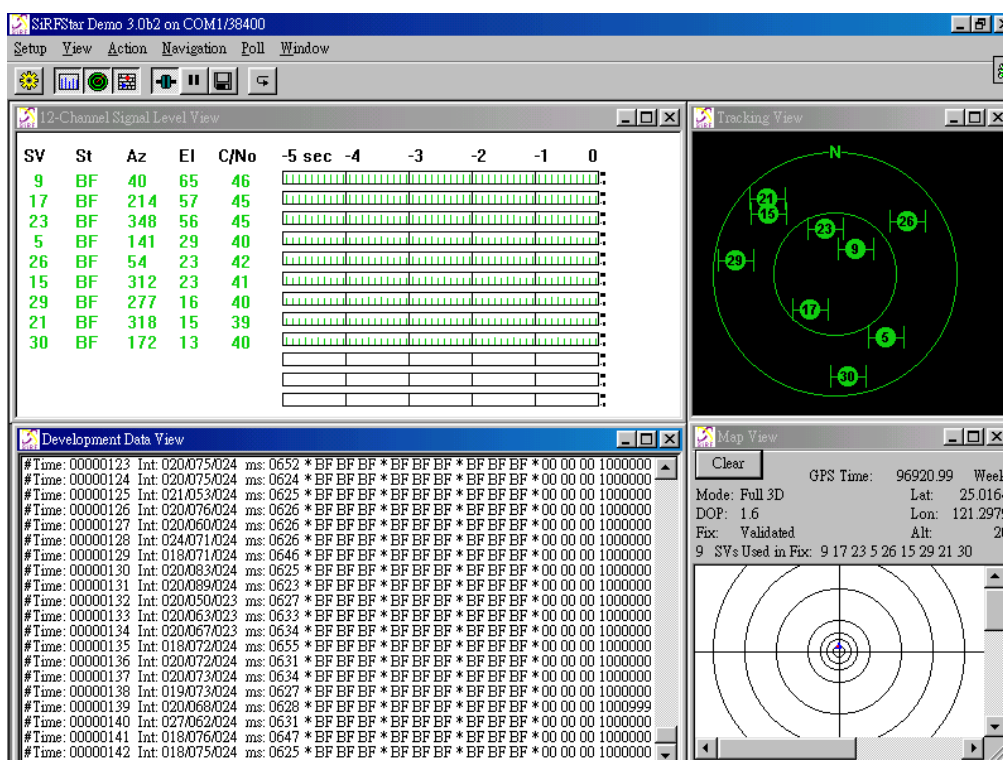


## To switch from NMEA to SiRF protocol

Check Action / Switch to SiRF Protocol.



You could see the following screen after you switch to SiRF protocol.



#### 12-Channel Signal Level Data:

Information Displayed	Description
Satellite Number (SV)	GPS satellite PRN number
Status (St)	Satellite status
Azimuth (Az)	Satellite azimuth (in degrees)
Elevation (El)	Satellite elevation (in degrees)
C/No	Signal level (in dB-Hz)
Signal Level (-5 sec)	5-second history

#### Tracking view:

Green: Satellite is tracked and used to

calculate the navigation solution.

Blue: Satellite is tracked but is not used to


calculate the navigation solution.

Red: Satellite is lost tracked.

**Development data view:** It is for

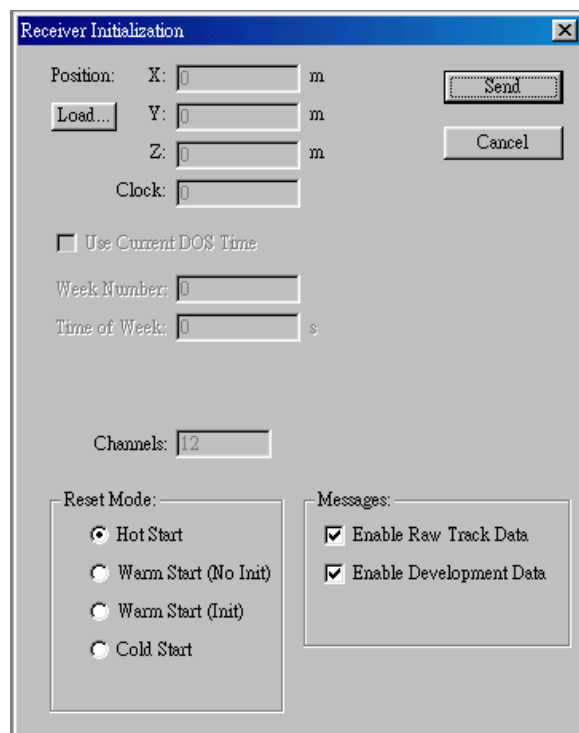
development purpose not for user.

**Map View:** Demonstrate the GPS time, Latitude, Longitude, Altitude and Navigation mode etc.

Click the  button to initialize data source.

It provides the cold start, warm start and hot start test functions. The receiver initialization view is like follows:

### Initialize Data Source



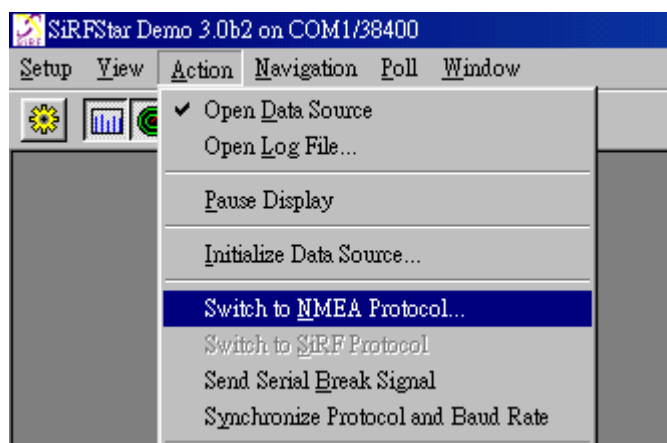
The image shows a 'Receiver Initialization' dialog box. It contains several input fields: Position (X, Y, Z) in meters, a Clock field, a 'Load...' button, a 'Send' button, and a 'Cancel' button. There are checkboxes for 'Use Current DOS Time', 'Week Number', and 'Time of Week'. A 'Channels' field is set to 12. A 'Reset Mode' section has four radio buttons: 'Hot Start' (selected), 'Warm Start (No Init)', 'Warm Start (Init)', and 'Cold Start'. A 'Messages' section has two checked checkboxes: 'Enable Raw Track Data' and 'Enable Development Data'.

The definition of cold start, warm start and hot start is described as following table:

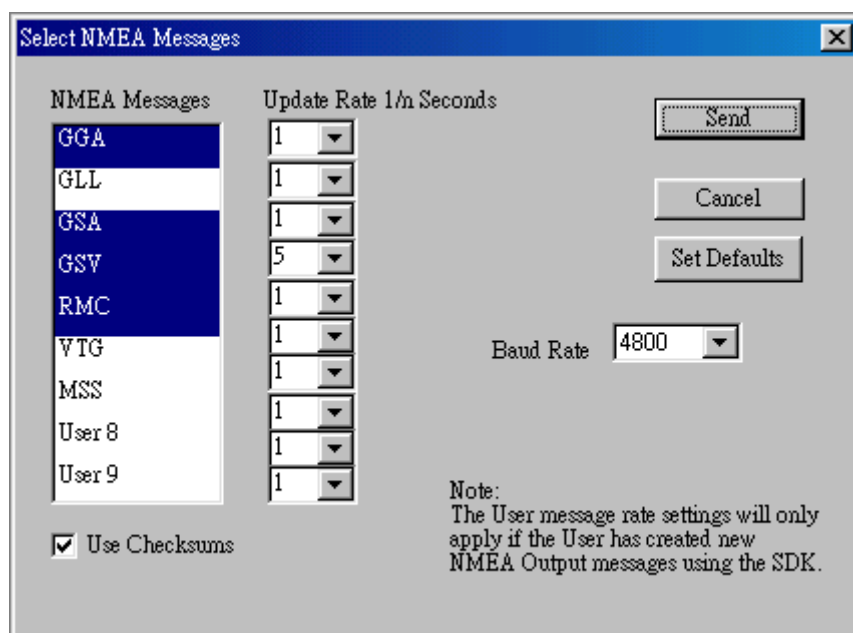
Option	Description
Hot Start	The Evaluation Unit restarts by using values stored in the internal of the GPS receiver.
Warm Start (No init)	This option has the same functionality as Hot Start except that Ephemeris data and retains all other data.
Warm Start (init)	This option clears all initialization data in the GPS receiver and subsequently reloads the data that is currently displayed in the GPS receiver initialization is cleared.
Cold Start	This option clears all data that is currently stored in the internal memory of the GPS receiver including position, almanac, ephemeris, time, and clock drift.

### To switch from SiRF protocol to NMEA protocol

(1) Select the “Action/Switch to NMEA Protocol” like follows.



(2) After you select the “Switch to NMEA Protocol”, it will show up a “Select NMEA Messages” dialog. Select the NMEA Messages that you want to use.



(3) Determine the update rate for each NMEA message

(4) Select the baud rate that you want to use from the Baud Rate pull down menu.

(5) Click the OK button to save or Cancel button to exit

(6) It will switch to NMEA protocol.

### To Synchronize Protocol

When you don't know what the protocol/baud

rate is set, you can use this option to synchronize protocol. Select the Action/Synchronize Protocol and Baud Rate. It will synchronize the protocol and Baud Rate.

### To Switch Trickle Power Parameters from SiRFDemo.exe

There are two modes of low power operation:

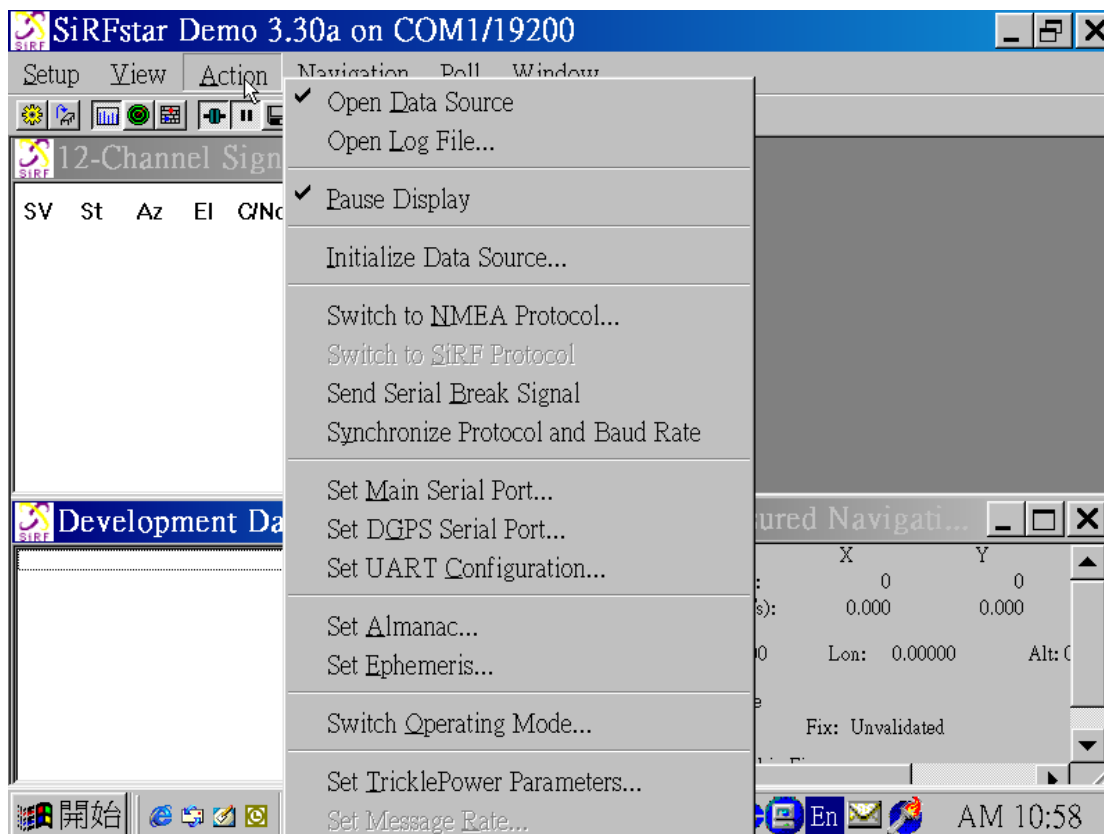
- (1) Trickle power: In TricklePower mode, the power to is cycled periodically, so that it

operates only a fraction of the time.

- (2) Push to fix: In Push-to-Fix mode, the receiver is generally off, but turns on frequently enough to collect ephemeris. So that, upon user request, a position fix can be provided quickly

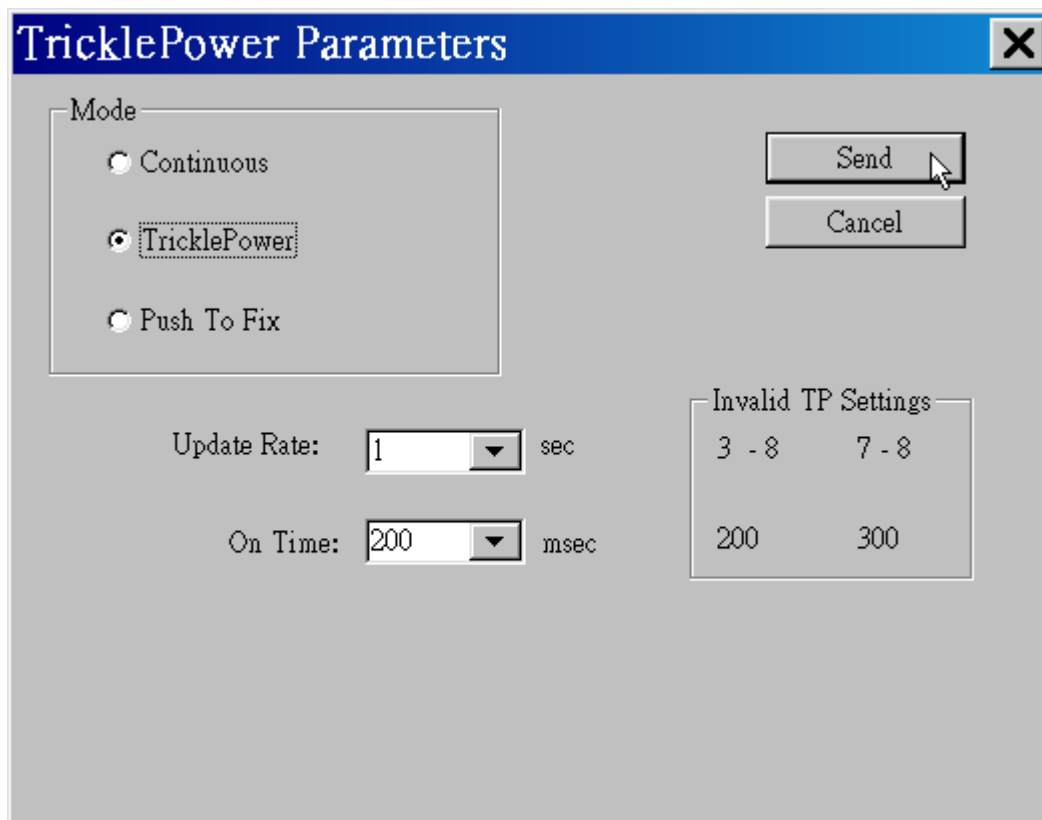
after power-up.

To enable trickle power mode from SiRFdemo.exe, please select the “Action/Set TricklePower Parameters” like following picture.



Then, it will show a “TricklePower parameters” dialog for parameters setting. There are two parameters of Trickle power that needs to be set, “Update Rate and On Time”. The “Update Rate” means the navigation update frequency. For example, “1 sec” means output once per second and “2 sec” means output once per 2 seconds. The “On time” means running time in the output period. For example, “200 ms” means the running time is 200 ms per navigation update. The duty cycle of trickle power is determined by setting of “Update Rate” and

“On Time”. For example, if the “Update Rate” is 1 sec and “On time” is 200ms, the duty cycle is  $200\text{ms}/1000\text{ms} = 20\%$ . If the “Update Rate” is 2 sec and “On Time” is 300 ms, the duty cycle is  $300\text{ms}/2000\text{ms} = 15\%$ . The duty cycle is limited to 5% ~ 50%. Since it will do some estimation in trickle power, please tune the proper duty cycle that can compromise the power consumption and acceptable navigation performance. The “TricklePower Parameters” dialog is shown as following picture.



### To change TricklePower parameters from 12 pins interface.

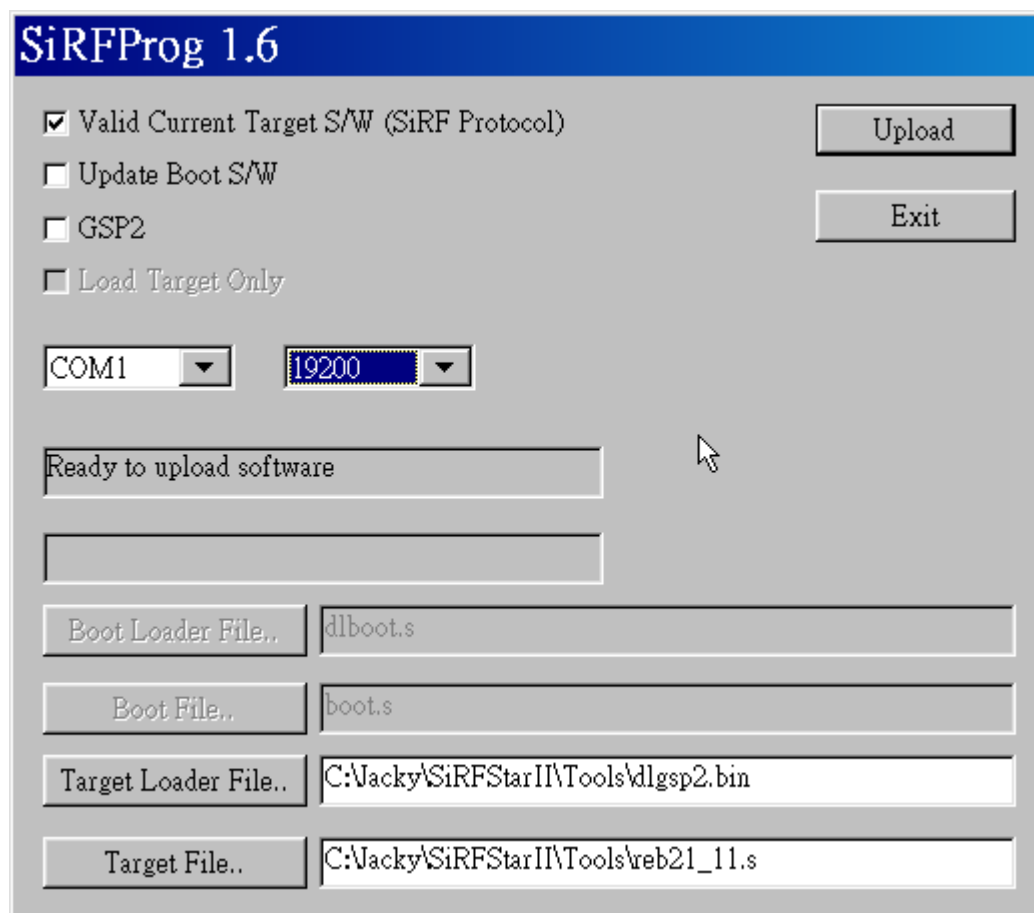
Since it is NMEA output default, it needs to change to SiRF protocol before change TricklePower parameters. The procedure is described as follows:


- (1) Use "Set Serial Port" command of SiRF NMEA input messages.  
\$PSRF100,0,9600,8,1,0\*0C<CR><LF>  
It will switch from NMEA to SiRF protocol.
- (2) Use "Set Trickle Power Parameters - Message I.D. 151" to set the trickle power parameters.
- (3) Use "Switch To NMEA Protocol - Message I.D. 129" to switch back to NMEA protocol.

### To upgrade GPS engine board program

- (1) Push and hold the **BOOT** button.

- (2) Run the SiRFProg.exe.
- (3) Select the Target Loader File. Select dltarget.s for STAR1. Select dlmsp2.bin for STAR2.
- (4) Select the Target file that need to be programmed into flash memory.
- (5) Select the COM port. Keep the Baud rate at 4800 for RGM-2101/3000 REB-2101 and 9600 for REB-12R.
- (6) If you want to upload program to REB-2101, please assert the GSP2 check box. But leave it unasserted for REB-12R.
- (7) Click Upload to begin programming flash memory.
- (8) Release the **BOOT** button.
- (9) Now it will run the new program that uploaded into flash memory.

**NOTE :**

1. When you use USB to Transmitting signal you don't need to plug the power adapter because USB can support power to the evaluation kit .
2. Before you turn on the power you must check the voltage and Transmitting signal function if correct for the product .
3. REB-12R series have different connection type so you should check if it was correctly mounted or not by PIN1.
4. While you use USB port to connect evaluation kit, please be sure that connection icon  is disconnected before you do some adjustment on the dip sw or switch off the power. Otherwise, the USB port will hang & can't be used .